MATHS ONLINE

By: Kru Tar

TOPMaths
A* Level

Straight line graphs

P1

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Objectives

1) Gradient
2) Parallel and Perpendicular lines
3) Midpoint
4) Length between 2 points
5) x and y - intercepts
6) Equation of a straight line
7) Perpendicular bisector
8) Point of intersection
9) Area of triangle

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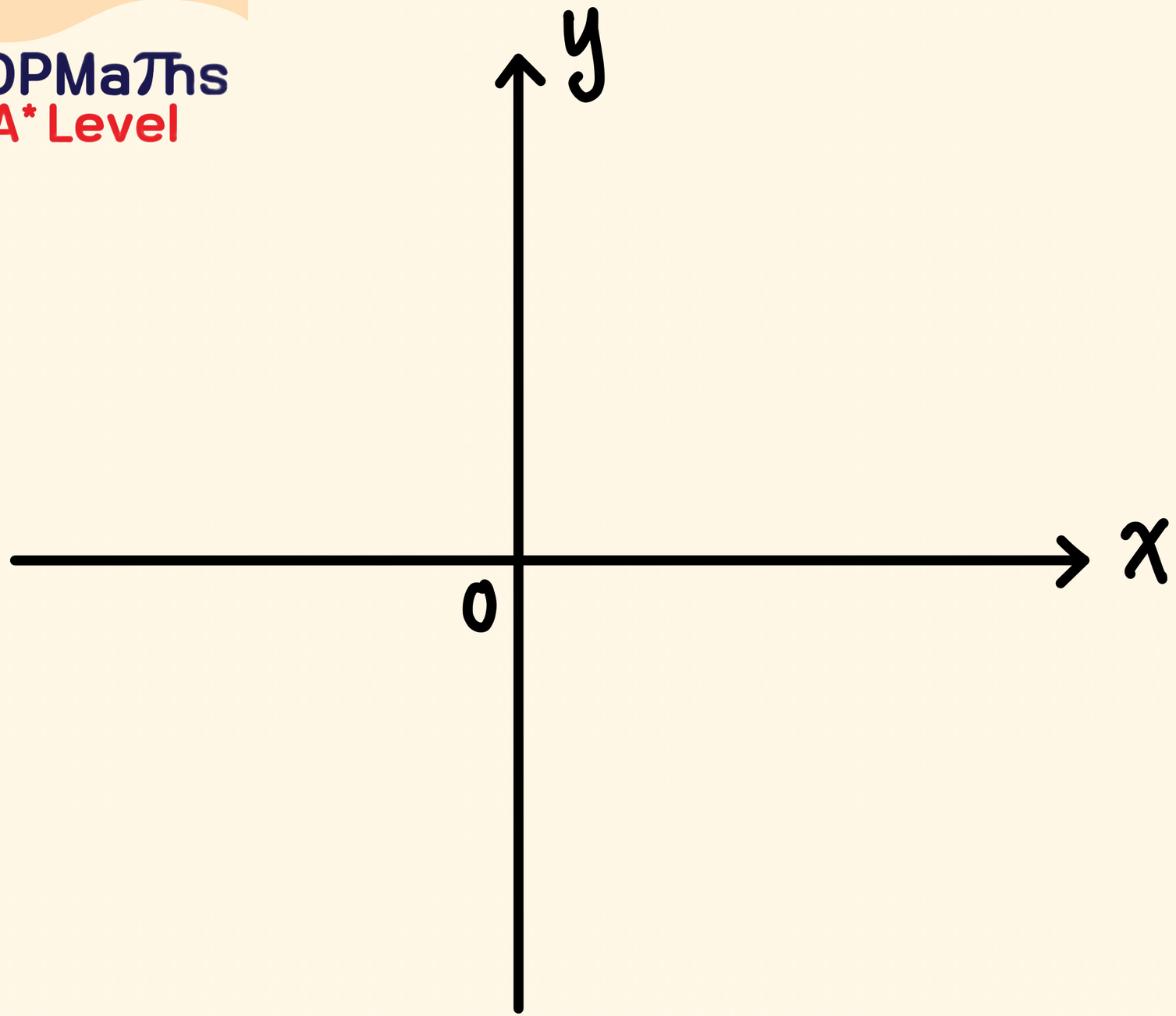
gradient



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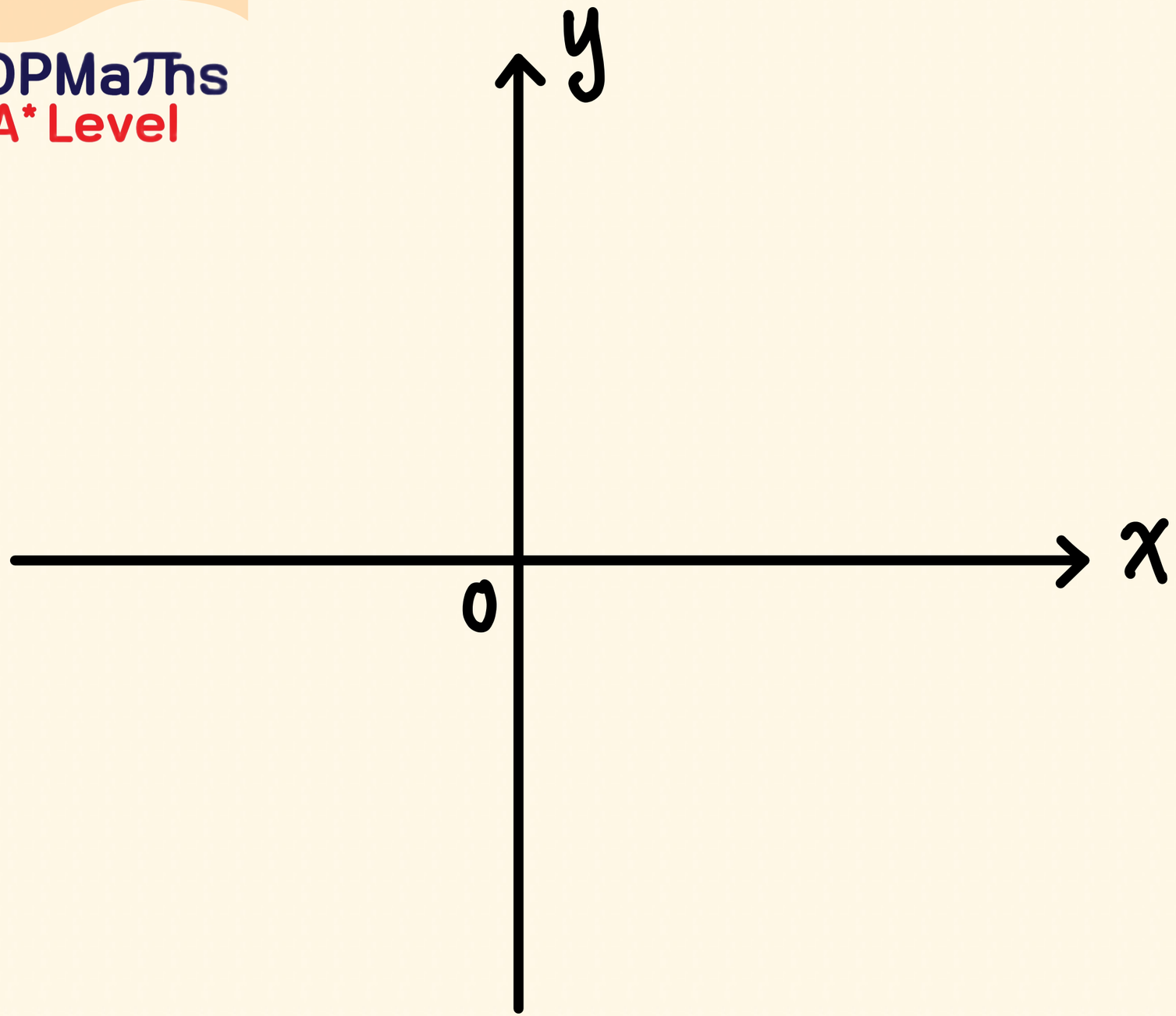
gradient



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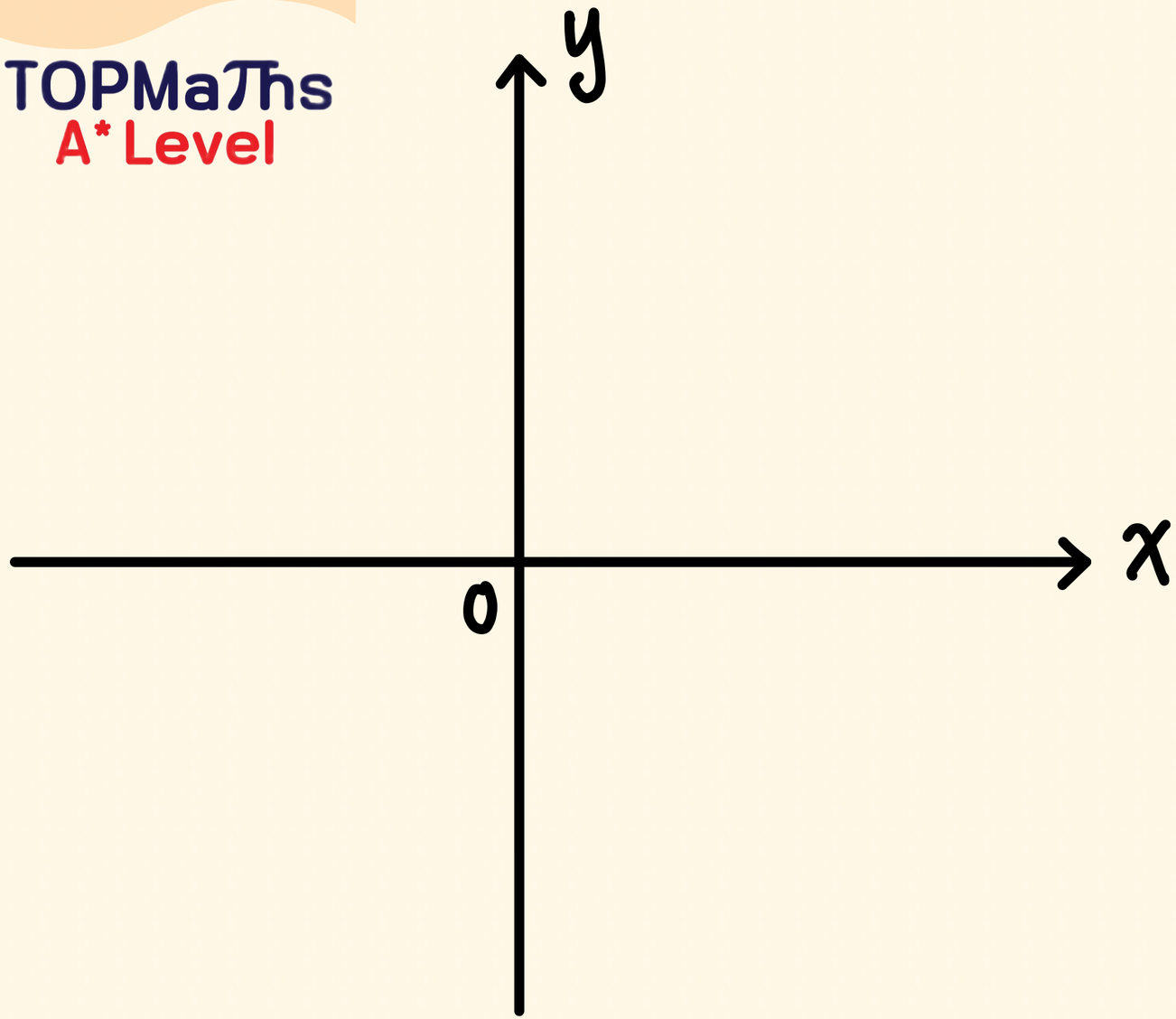
Parallel lines



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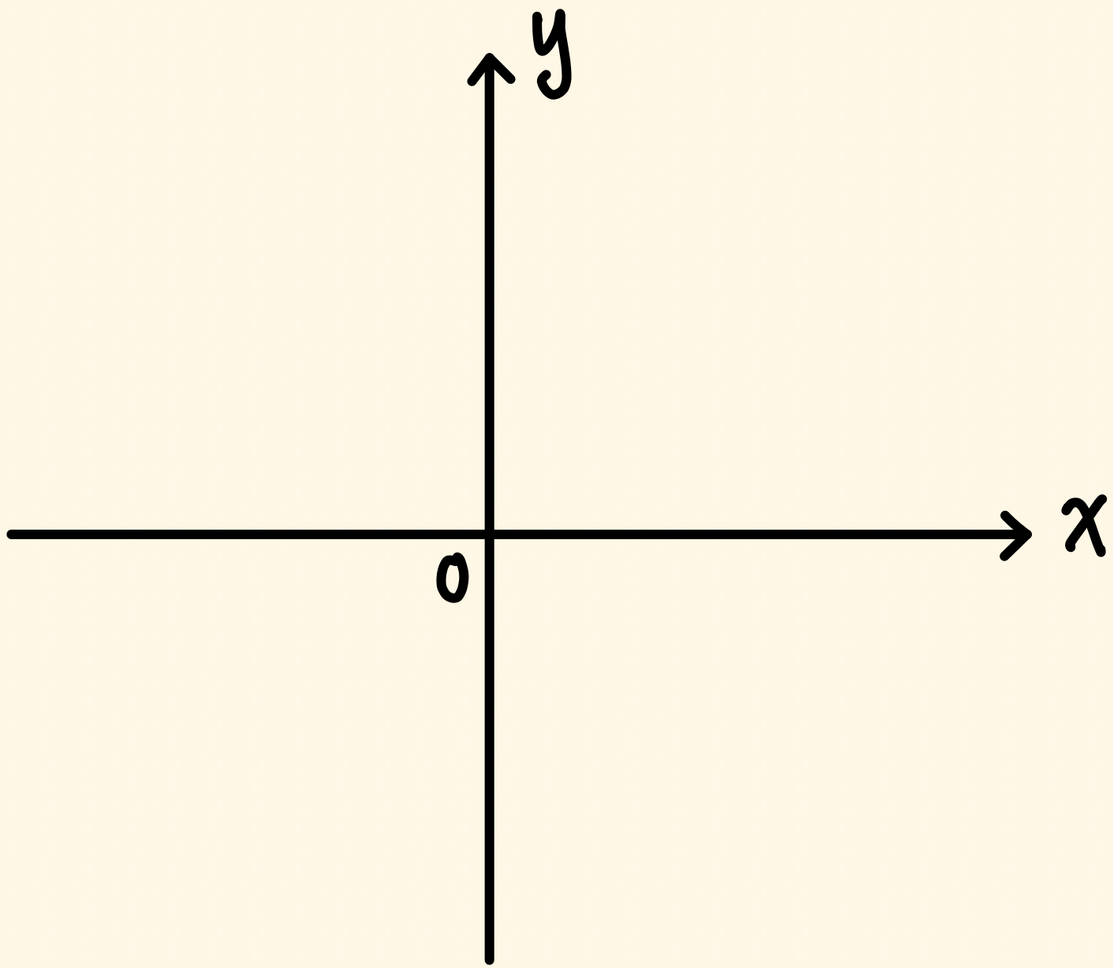
Perpendicular lines



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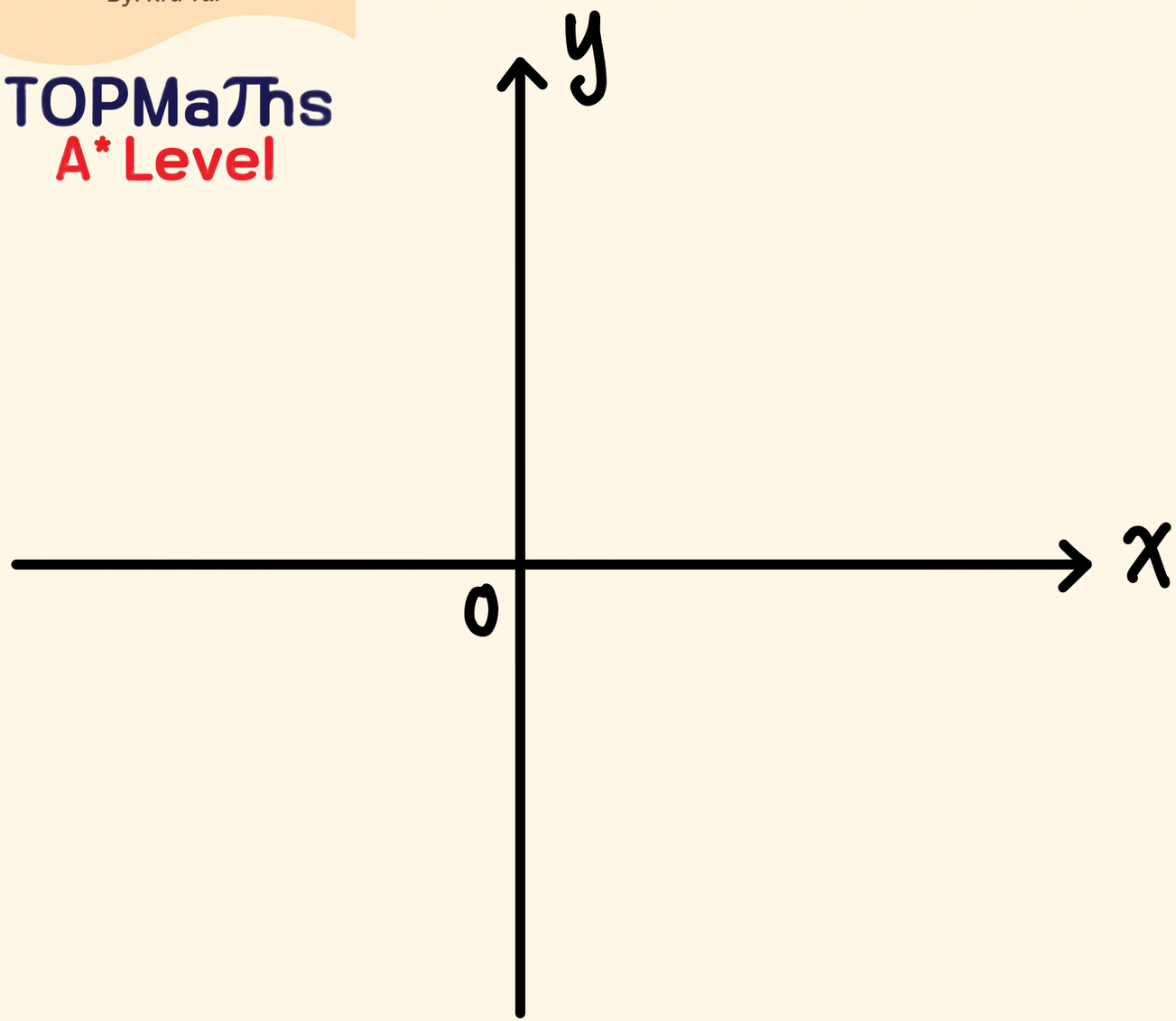
Midpoint



Ex. (-2,3) and (10,17)

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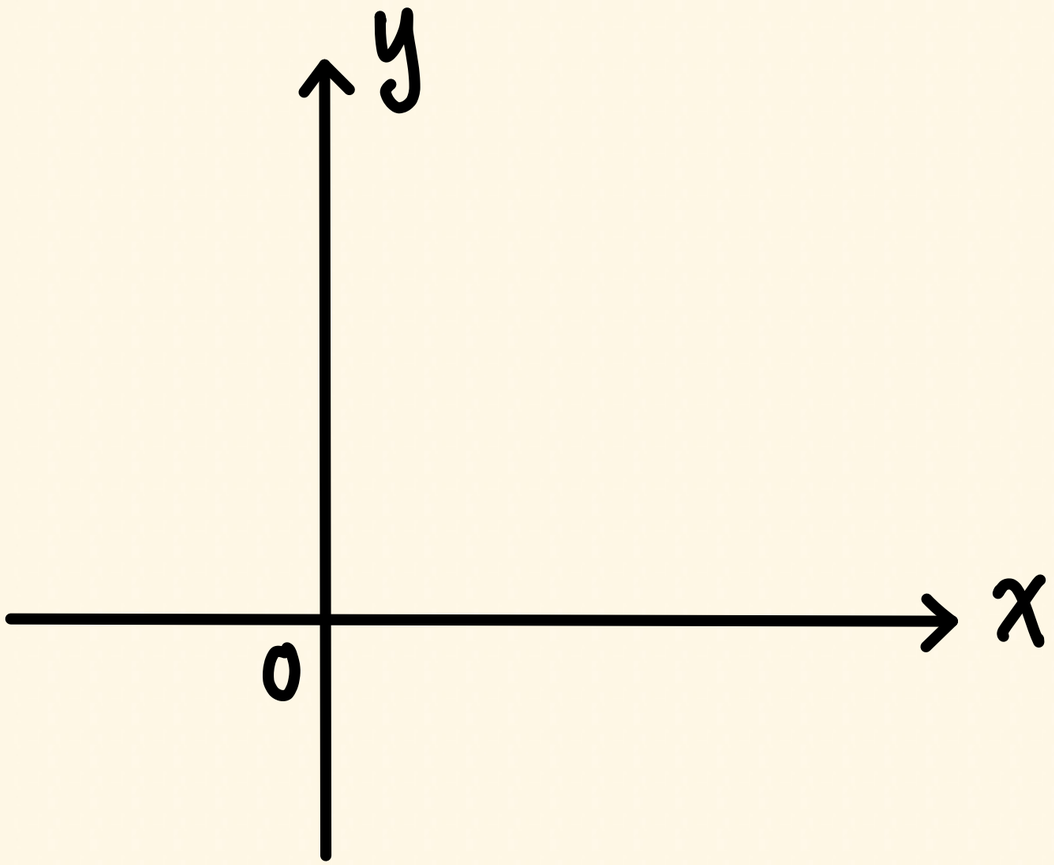
Length or Distance between two points



Ex. (1,5) and (4,9)

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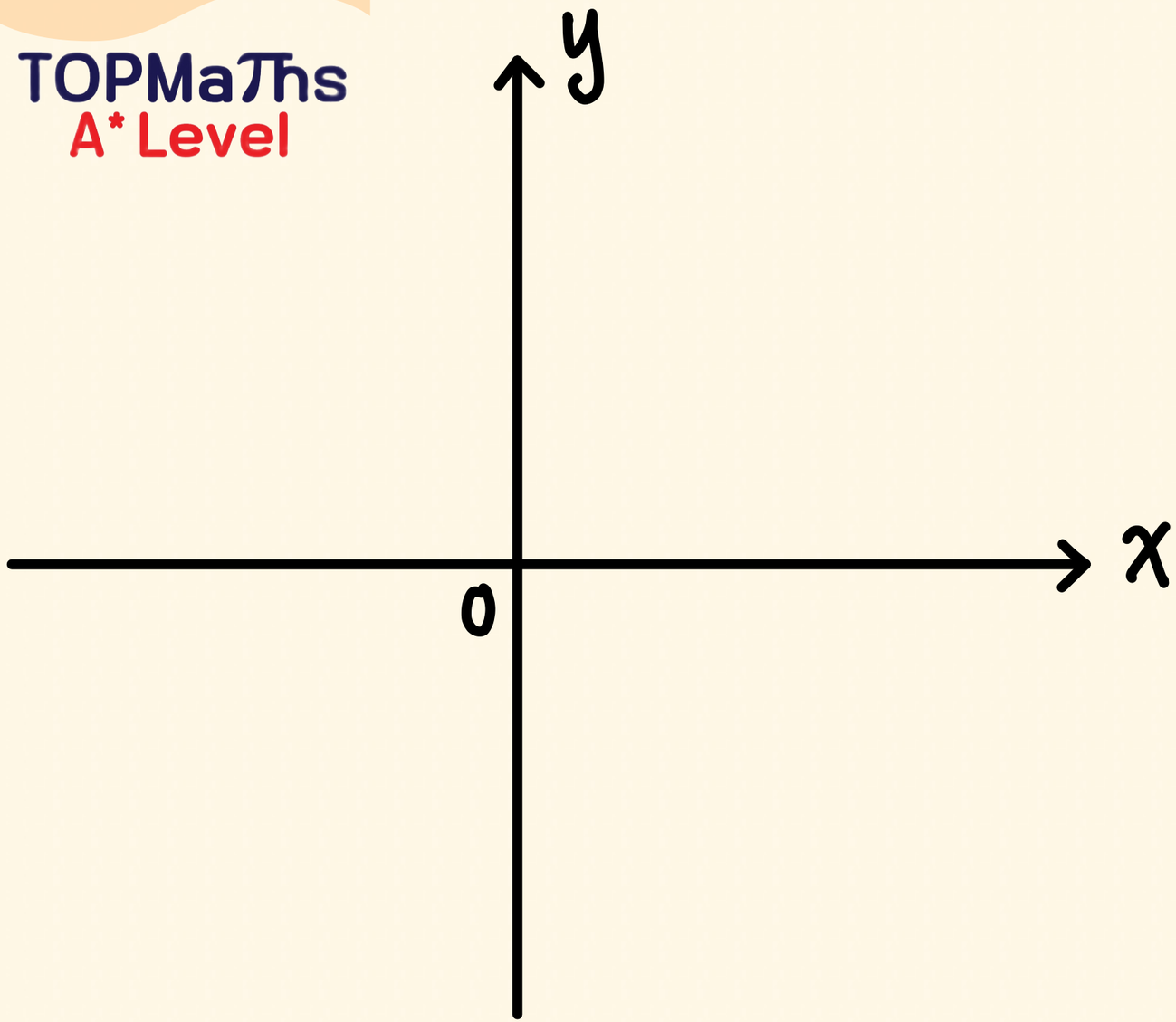
x-intercept

y-intercept

Ex. Line $y = 2x+1$



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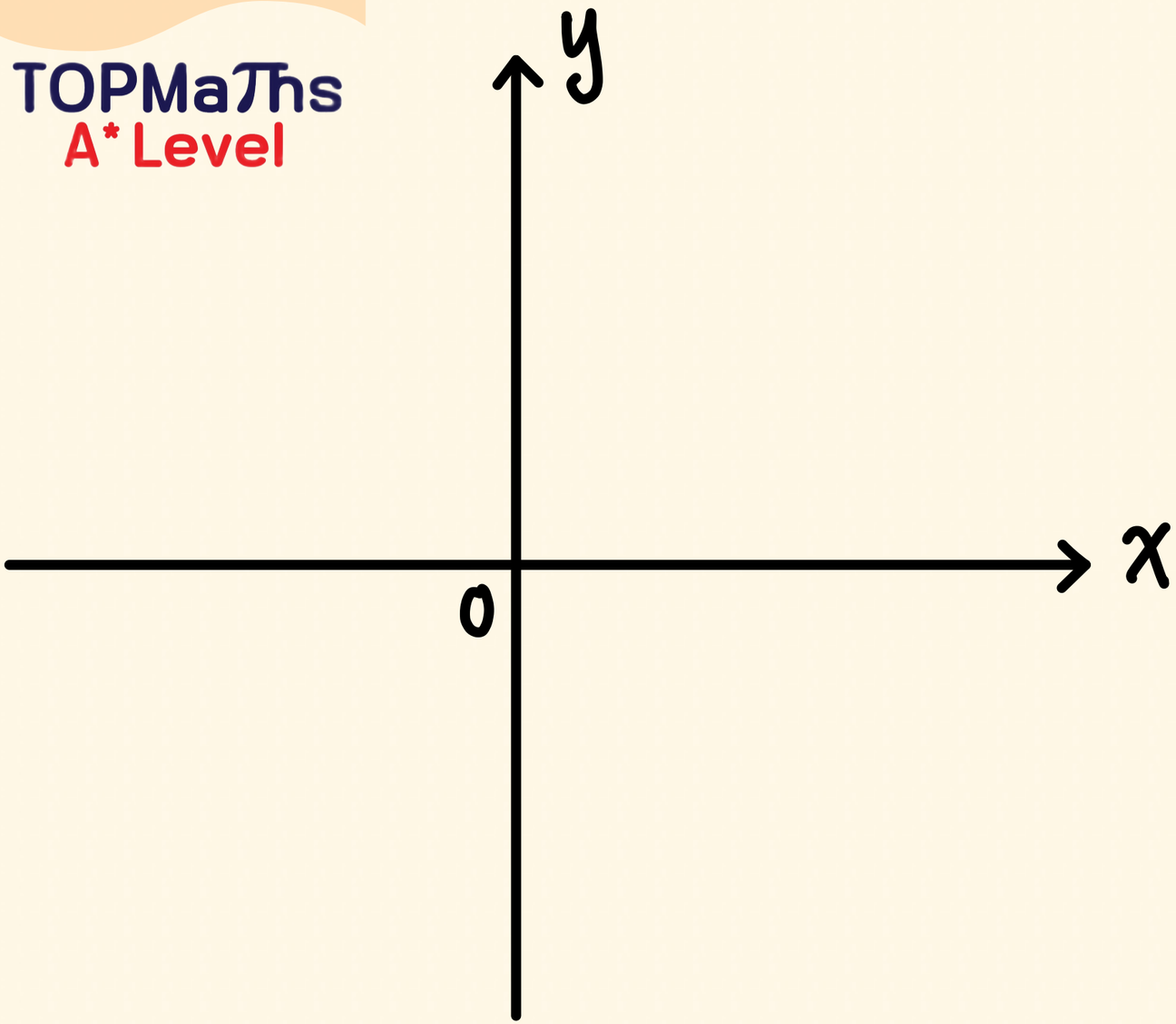
Equation of a straight line



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Equation of a straight line

$y = mx+c$

Give your answer in the form $ax+by+c = 0$ where a, b and c are integers.

Ex. gradient = 2
a point (0,9)

Ex. gradient = $-\frac{1}{2}$
a point (3,1)

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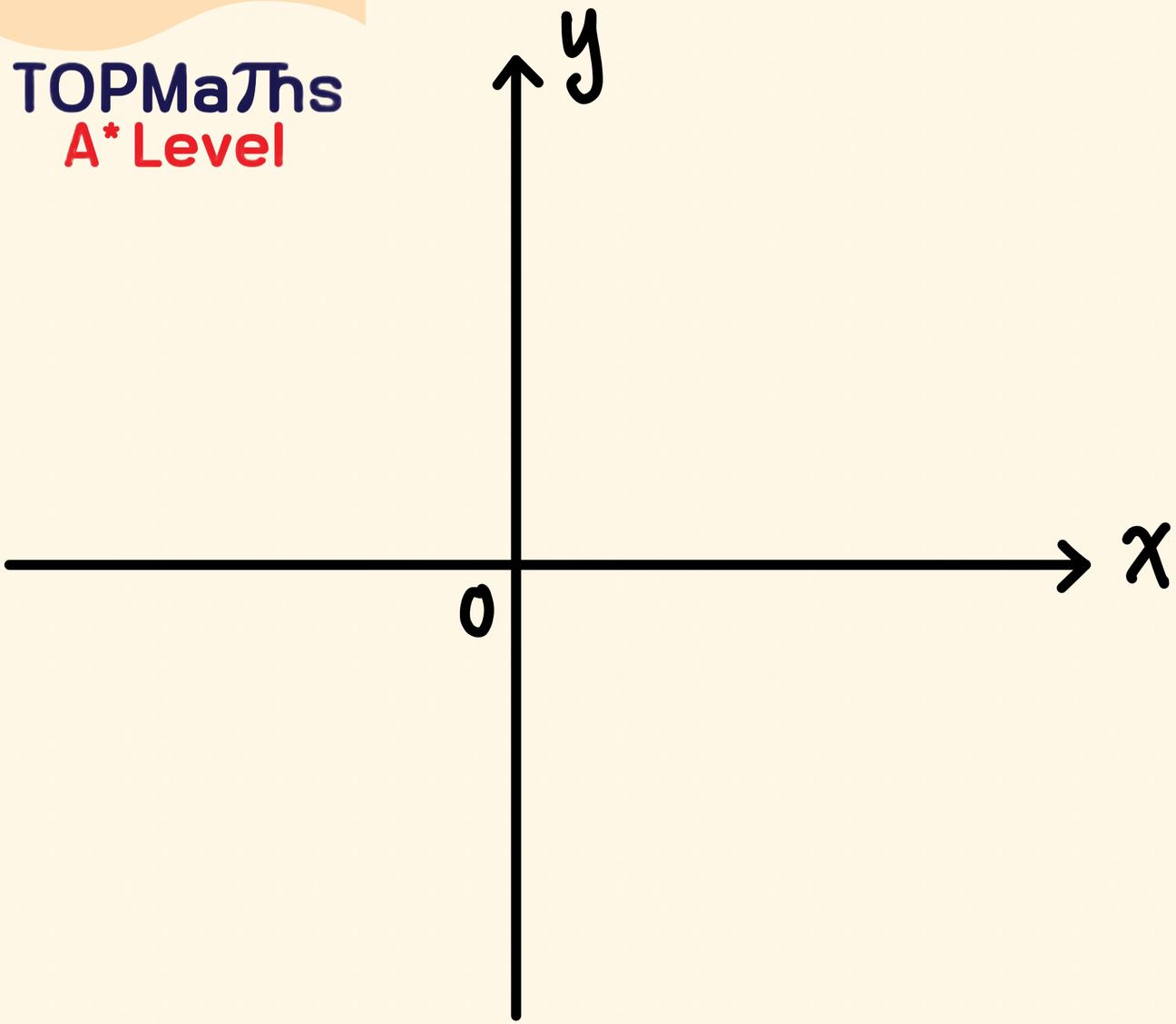
Equation of a straight line



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Equation of a straight line

$$y - y_1 = m(x - x_1)$$

Give your answer in the form ax+by+c = 0

where a, b and c are integers.

Ex. gradient = -2

a point (0,5)

Ex. gradient = $\frac{2}{3}$

a point (9,6)

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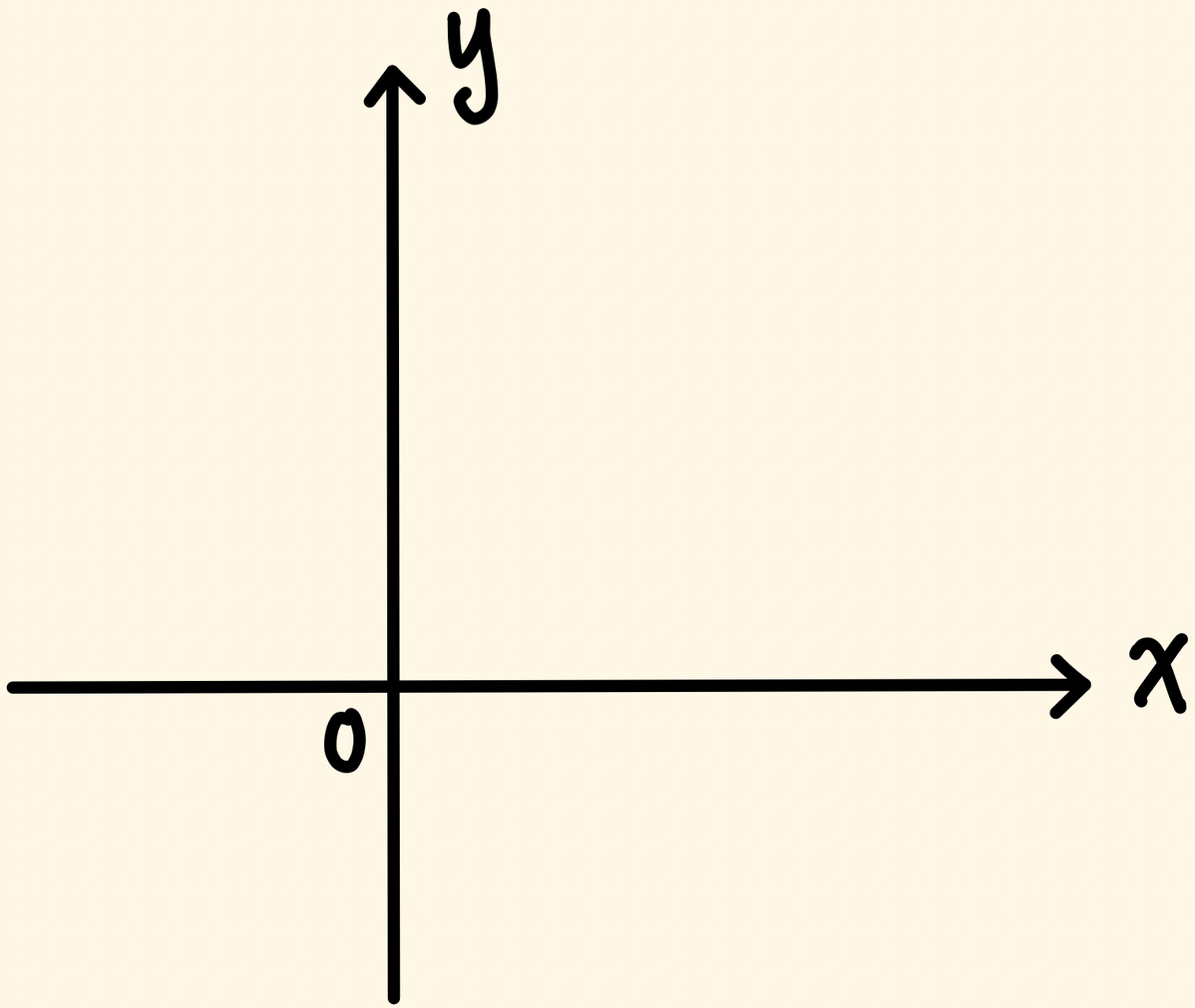
Perpendicular bisector of AB



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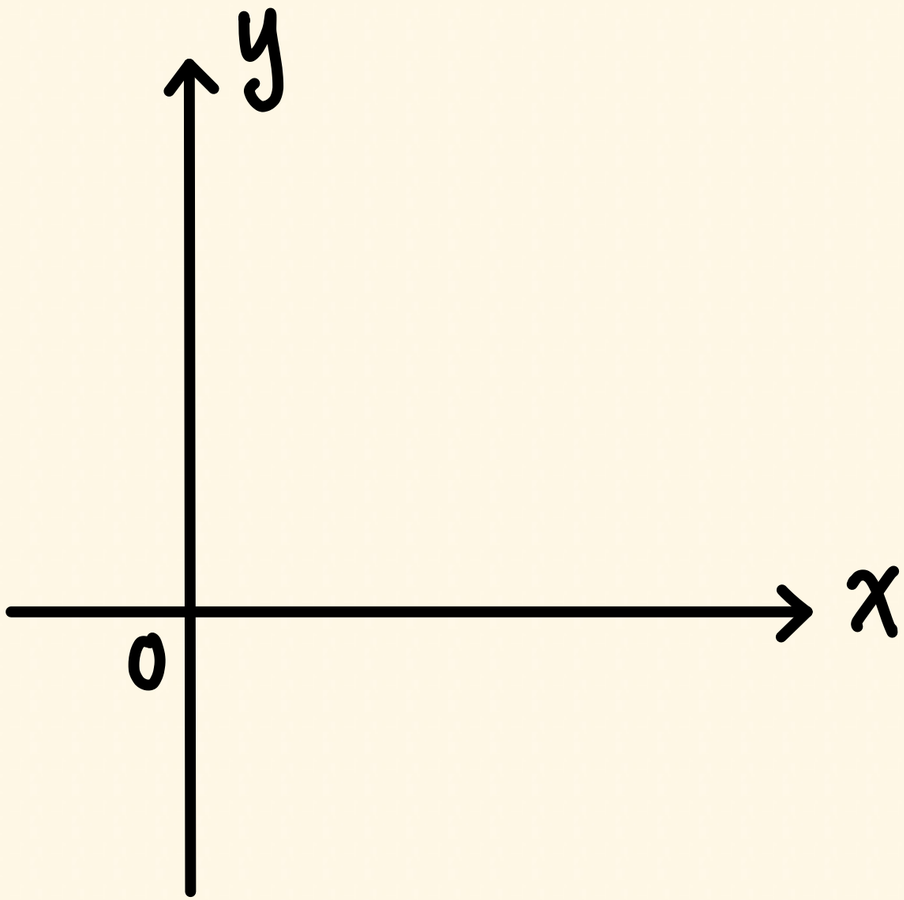
Perpendicular bisector of AB

Ex. A(6,3) and B(10,11)



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Intersection point between two lines

Ex. Find the point of intersection between $y = 2x+10$ and $y = -3x+5$.

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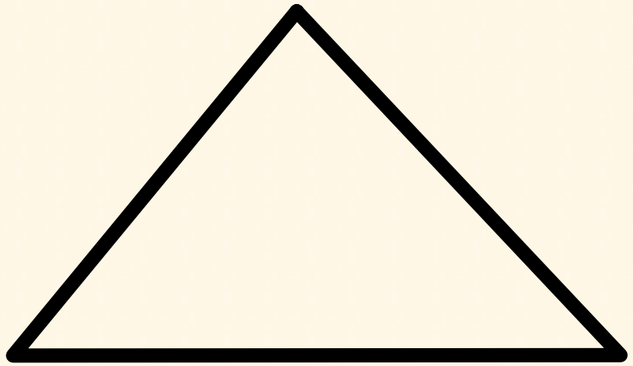
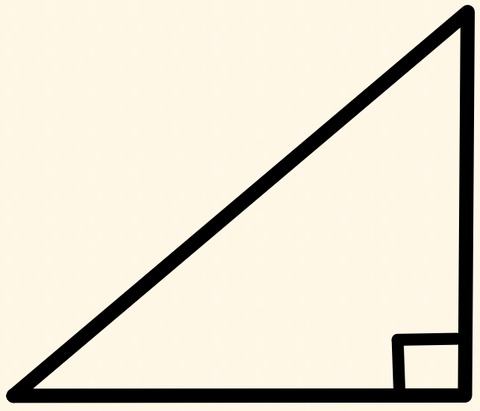
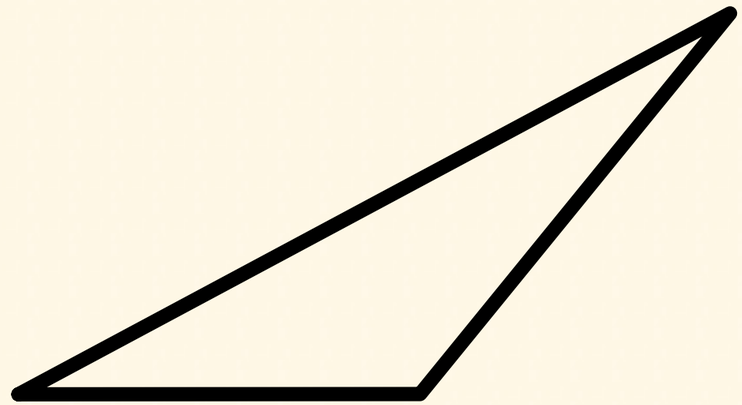
Area of triangle







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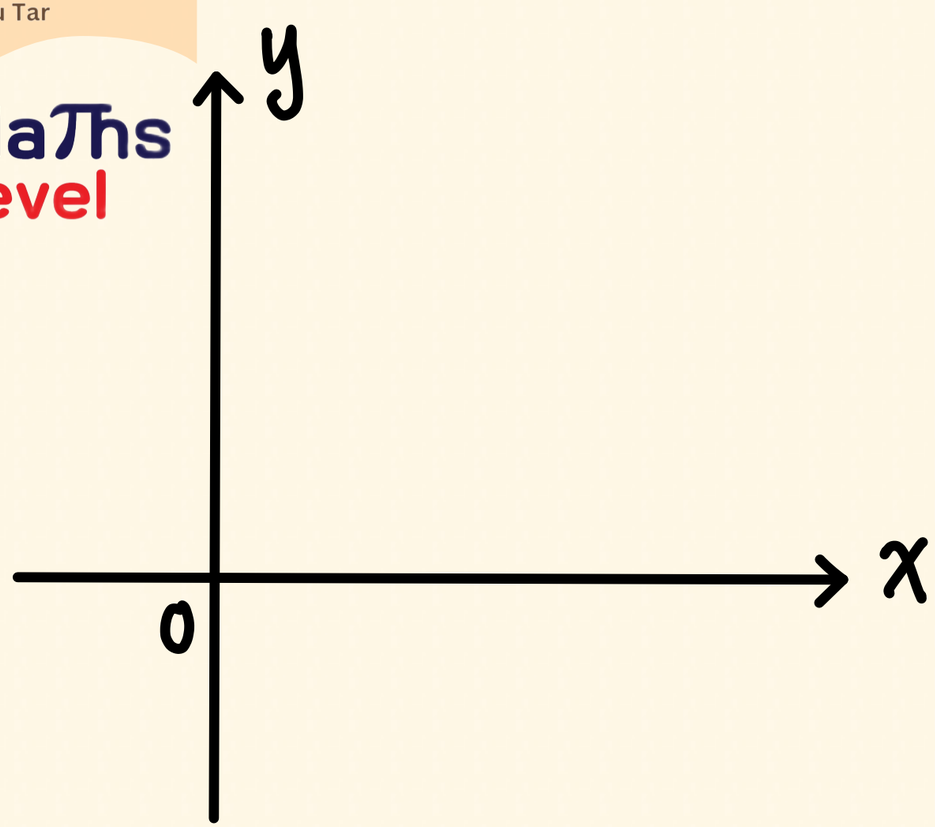
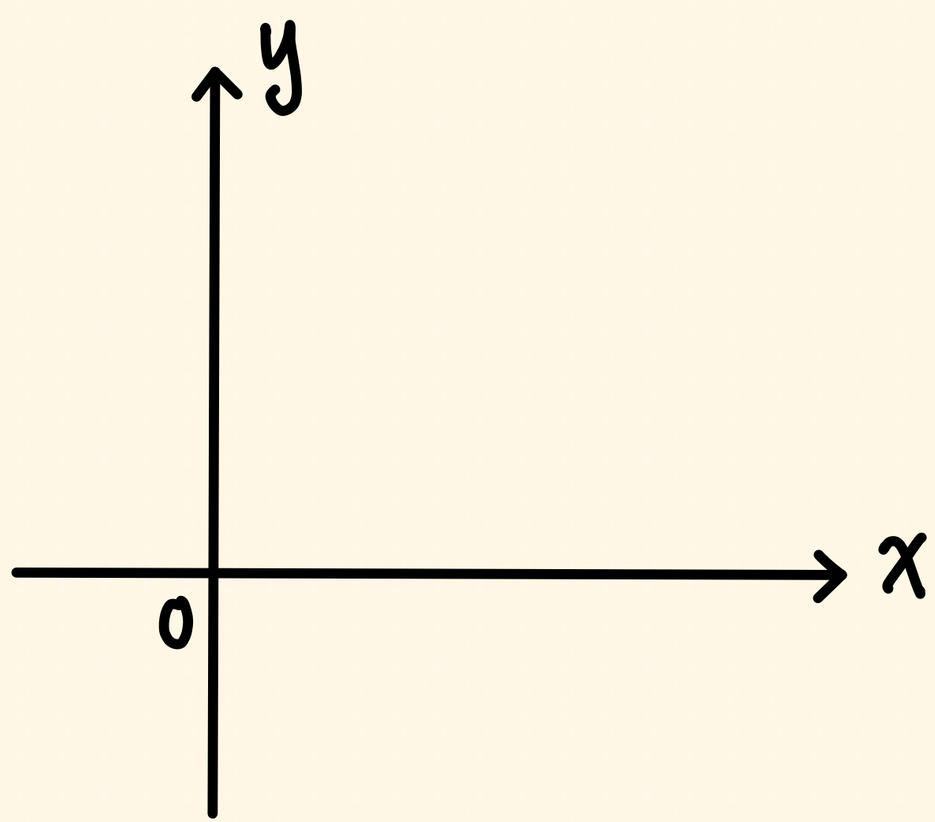
Area of triangle $= \frac{1}{2} \times b \times h$





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Ex.1 Find the gradient of line joining (-3,8) and (6,2).

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Ex.2 The line which passes through A(-4,5) and B(7,k) has gradient -2. Find the value of k.

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Ex.3 Determine whether or not the points A(3n,7n), B(0,9n) and C(6n,5n) are collinear.

Collinear ⇒ All points lie on the same straight line.

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Ex.4 Write down the value of gradient and y-intercept of the following lines

i) $y = -\frac{2}{5}x + 3$

ii) $3x - 2y + 8 = 0$

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Ex.5 Rearrange the following lines in the form ax+by+c = 0 where a, b and c are integers.

i) $y = 2x - 5$

ii) $y = -\frac{2x}{3} + 4$

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Ex.6 The line $3x+2y-5 = 0$ meets the x-axis at the point A and the y-axis at the point B. Find the coordinates of A and B.

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Ex.7 A straight line passes through the points A(4,-1) and B(-4,5).

i) Work out the gradient of the line.

ii) Find an equation of the line in the form $ax+by+c = 0$ where a, b and c are integers.

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Ex.8 A line passes through the point (-3,5) and has a gradient of $\frac{1}{2}$. Find the equation of the line.

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Ex.9 The points A(8,-3) and B(1,6) lie on a straight line L. Find the equation of line L in the form ax+by+c = 0 where a, b and c are integers.

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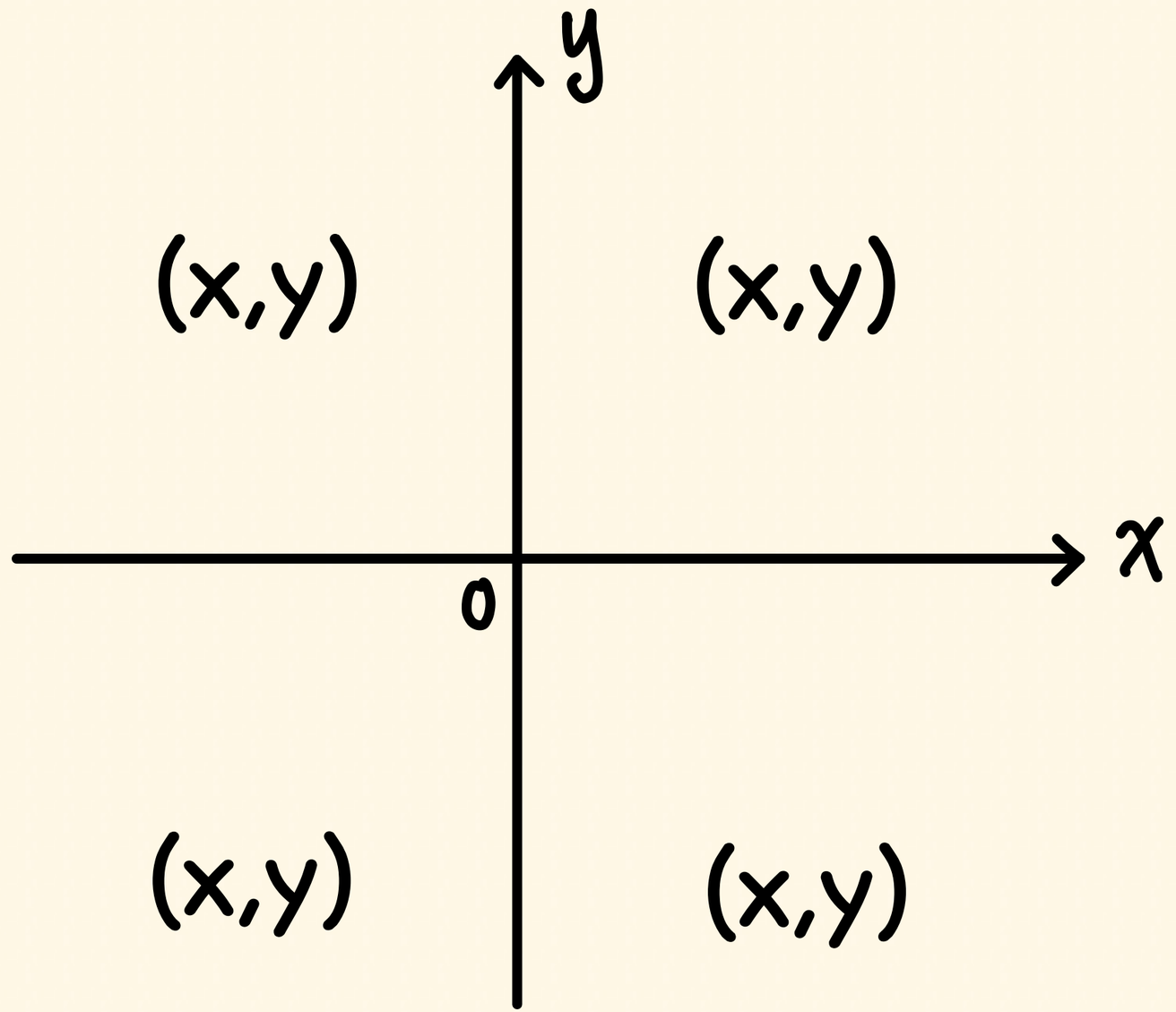
Quadrant



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Ex.10 The line $y=2x+3$ and $y=-3x+8$ intersect at the point A. The line $y=2x+3$ also meets the x-axis at the point B. Find the equation of the line joining the points A and B.

Ex.11 Determine whether these pairs of lines are parallel, perpendicular or neither :

i) $2x-3y+1 = 0$

$3x+2y+8 = 0$

ii) $y=3x+1$

$3x+y-5 = 0$

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Ex.11 Determine whether these pairs of lines are parallel, perpendicular or neither :

i) $2x-3y+1 = 0$

$3x+2y+8 = 0$

Ex.11 Determine whether these pairs of lines are parallel, perpendicular or neither :

ii) $y = 3x+1$

$3x+y-5 = 0$

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Ex.12 Find the equation of a line which is parallel to $3x-2y+5 = 0$ and passes through the point $(1,6)$.

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Ex.13 Find the equation of a line which is perpendicular to $5x+3y-15 = 0$ and passes through the point $(-2,10)$.

Give your answer in the form $ax+by+c = 0$

where a, b and c are integers.

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Ex.14 The points A and B are (-2,5) and (8,1) respectively. Find the equation of the perpendicular bisector of line segment AB.

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Ex.15 Find the length between (3,-5) and (4,2).

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Ex.16 The distance between the point (3,2) and (7,y) is $4\sqrt{5}$. Find the values of y.

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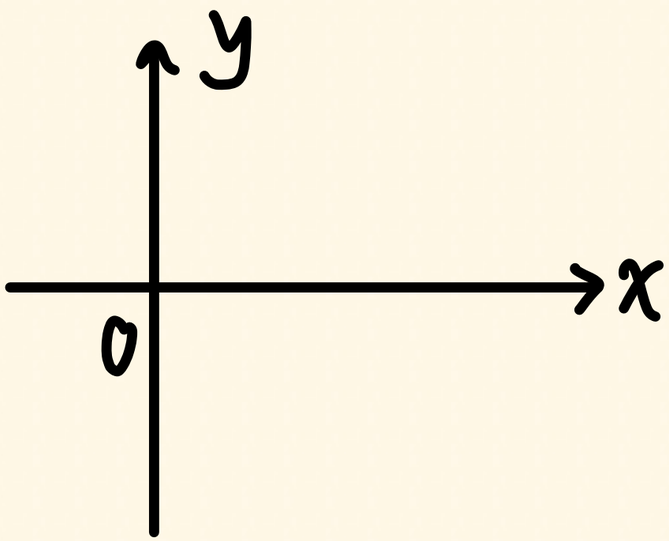
Ex.17 A line L1 has equation $x-2y-15 = 0$ and meets the x-axis at A. The line L2 has equation $5x+2y+9 = 0$ and intersects with L1 at B. Find the area of triangle AOB where O is the origin.



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Conclusion

1) gradient $= m = \dfrac{y_2 - y_1}{x_2 - x_1}$

2) Parallel $m_1 = m_2$

3) Perpendicular $m_1 \times m_2 = -1$

4) Midpoint $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$

5) Length $= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

6) Equation of straight line

$y = mx + c$ OR $y - y_1 = m(x - x_1)$

7) Area of triangle $= \frac{1}{2} \times b \times h$